

In order to facilitate a smooth construction project, lane closures were minimized, complicated work was done on evenings and weekends, and regular updates were given the public and media.



LOUISIANA Breaking through the Bottleneck

LOUISIANA'S I-10/I-610 INTERCHANGE ALSO CRITICAL PATH FOR HURRICANE EVACUATION

As one of the ten worst bottlenecks in the country, the I-10/I-610 Interchange outside New Orleans was a nightmare for daily commuters. Originally designed for a maximum capacity of 70,000 vehicles, up to 200,000 cars used the five-mile roadway to travel between downtown New Orleans and the western suburbs daily, with drivers often stuck for more than 40 minutes in each direction.

The I-10/I-610 Interchange was inherently different from standard road and bridge projects in that it had to be designed and built in the marshy environment of New Orleans and to standards that could withstand harsh weather conditions that occur during hurricane season. As a critical hurricane evacuation route from New Orleans as well as a vital central artery, the project was deemed essential by the Louisiana Department of Transportation and Development (DOTD) and its successful design and construction would be credited with saving peoples' lives during Hurricane Katrina.

In January, 1998, contractor Boh Bros., along with DOTD and various subcontractors, entered into a partnership to redesign and reconstruct the Interchange, a project that would exceed specifications and reach completion eight months ahead of schedule. Today, the new Interchange accommodates 176,000 vehicles, allowing traffic to flow more smoothly during normal rush-hours as well as during emergency evacuations.

From the outset of the project, the team focused on delivering a quality product while minimizing the effects of work zones on the traveling public. In addition to applying their own quality control programs, the contractor implemented DOTD's Quality Assurance/Quality Control Program, and the Federal Highway Administration's (FHWA) Independent Assurance Program. These robust programs resulted in the use of high quality materials and overall results that exceeded project specifications. Work zone traffic flow was maintained through frequent and clear communication with the media to provide traffic information and alternate routes in a coordinated effort to combat congestion. State and local police, including DOTD's Motorist Assist Patrol, helped assist travelers with car troubles, again maintaining the flow of traffic.

Perhaps the greatest achievement of the project was its early completion, allowing the bottleneck to be relieved eight months early. High control standards, successful partnering, contract incentive/disincentive provisions, ambitious and thoughtful scheduling, timely materials delivery, and night and weekend work scheduling made early project completion possible.

The project is now featured as a best practice by Highways for LIFE, a Federal Highway Administration program that advances Long lasting highways using Innovative technologies and practices to accomplish Fast construction of Efficient and safe pavements and bridges.

The Project Peeled Back

The I-10/I-610 Interchange Project was the first in a series of eight designed to advance the flow of traffic and reduce congestion in the greater New Orleans area. The \$28 million, five-phase project was specifically designed to widen the Interstate and add lanes in all directions.

Phase One involved the widening of I-610 eastbound and the construction of a massive new bridge at the 17th Street Canal. Phases Two and Three called for widening I-10 westbound, widening I-610 westbound, and completing required bridgework. Phase Four required the completion of the eastbound Interstate widening, while Phase Five involved the finishing touches including milling and overlay of asphalt, re-striping, canal dredging, demolition and clean-up.

When the project was initiated in 1997, DOTD identified clear and definable goals, including timely completion, safety of the traveling public, and a good relationship with the media and commuters. DOTD also designed the project with positive incentives to help achieve these goals, such as a \$15,000 per day incentive/disincentive clause for completion before or after its three-year schedule.

To complete all five phases successfully, project partners not only ensured high standards in efficiency, safety and quality, but also pioneered innovations such as scheduling creativity through simultaneous phasing; maximized night and weekend work; and a single massive night concrete pour. Contractors applied bridge construction techniques in difficult areas that utilized “false work” to maximize efficiency and minimize damage to the surrounding area. The use of the Intelligent Transportation System (ITS) communications tool was also effective in maintaining traffic flow for travelers. These innovations, particularly the ITS, served as important learning opportunities for DOTD and have now been used on several additional projects in the unique construction environment that exists in Louisiana.

The Quality Imperative: Planning for the Worst Case Scenario

The planners and partners of the I-10/I-610 expansion project formally identified quality as the anchor of a charter signed by all 50 members on the team. The Partnership Charter committed the team to “providing a quality finished product” and went on to pledge that the product would be completed under budget and ahead of schedule, with minimal impact on the public, the environment and property. They also agreed in writing that “there would be no unresolved issues or legal liabilities,” a prospect that would require committed teamwork and leading edge communications between partners.

This broad commitment was put into action in two key ways. First, DOTD implemented its QA/QC program, which included a sampling plan customized

for the project to identify properly the method of sampling for each material, the frequency, and the sample size and certificate requirements. Both DOTD field inspectors and contract personnel were certified in the DOTD QA/QC Training Program in the areas of embankment and base course, asphalt paving, asphalt plant, Portland cement concrete paving and structural concrete. The inspectors regularly monitored the quality and progress of the work, obtained samples, and documented quantities.

Second, Boh Bros. Construction completed this “quality triad” by implementing its own QC program for its operations. Boh Bros.’ \$90 million fleet also contributed state-of-the-art equipment which helped increase overall quality, and the proximity of their equipment yard to the job site ensured equipment could be transported to and from the site quickly, efficiently, and with minimal cost. In addition, many of the contractor’s suppliers had quality control programs in place, which also encouraged consistency and value.

Test results of project materials revealed a first-rate conformance to the specifications, and ongoing performance since the project’s completion has verified these results. For example, of the nearly 3,000 concrete cylinders tested for this project, less than 0.1% failed to meet specifications. DOTD requires that the maximum variation per mile of longitudinal surface tolerance in asphalt not exceed 5.0 inches. The Average Profile Index for the asphalt laid in this project was a smooth 1.15 inches per mile variance. To bolster continued quality control throughout the project, any minor problems that occurred were immediately analyzed, and necessary modifications were made to prevent future problems. These performance goals were specified in the contract and tied to compensation. For Boh Bros. and partners to receive 100 percent of the pay, the entire project had to meet specified requirements for equipment, materials and final product.

Perhaps the greatest measure of quality occurred during the worst case scenario of Hurricane Katrina. During the New Orleans evacuation, the Interchange and related highway structures met Mother Nature’s challenges and helped save thousands of lives. Afterwards, the structures were of critical importance during the immediate recovery operations, too. And with little or no damage due to the high quality of design and construction, the Interchange is playing a key role in the revitalization of the New Orleans region today.

Strategy for Scheduling: Saving Time and Money

Strategic scheduling was a key innovation used on the interchange project. Boh Bros.’ original contract allowed for 1,100 calendar days (just over three years) for completion in February, 2001. However, the company engineered job scheduling, materials requisitioning and overtime throughout the project with the overarching goal of early completion.

Because traffic would occasionally impede access to the job site, careful planning was required to enable the team to meet the demands of the ambitious schedule. During initial planning phases, DOTD gave Boh Bros. suggested phasing for the project. The contractor took extra time to study these plans and find ways to meet traffic flow requirements, while delivering the job ahead of schedule. A plan was developed whereby work could commence on Phase Four while Phases One and Two were still under construction, which compressed the schedule by over three months. Boh Bros. scheduled night and weekend overtime hours so work could continue during off-hours with minimal traffic disruption, and hired additional equipment and more resources to achieve this goal.

In addition, trucking of material to and from the job site had to be coordinated with daily traffic patterns in mind. Critical Path Method scheduling enabled the team to monitor progress of over 1,300 tasks, and daily meetings were held so superintendents, foremen and subcontractors could organize work flow. These meetings gave team leaders the opportunity to discuss and resolve issues that might have created delays, again saving time and money.

With high quality materials and equipment, as well as good project planning and management, the team achieved a total recordable safety incident rate of 1.8 with zero lost time due to accidents and no fatalities, quite a feat considering that two and a half years of work was often accomplished within two feet of moving Interstate traffic.

Engineering Innovation in a High Stakes Corridor

Work on the Interstate's bridges was a key priority for the team as these would be critical to both traffic flow and emergency evacuation operations, when required. This meant the new canal crossings had to withstand floodwaters up to the top barrier rail, a very high standard of construction. As a result, deck and guard rails were poured in a single unit so bridges remained passable despite the worse-case scenario of flooded canals.

Due to the challenges posed by the marshlands throughout the corridor, the team created a new process material, called "false piles," and used these to speed construction work in the canals. "False piles" would serve as temporary trestles for the pile-driving crane. With these in place, the crane could move further out into the canal to drive the permanent piles. The temporary piles were later used as supports for the forming false work of the three-foot thick bridge deck, making them doubly essential to project success.

Another challenge faced by the team was the placement of the trestle girders. These had to be level to support the crane, but a tilted roadway would be needed for the finished bridge. The Boh Bros. team poured hundreds of cement grout pads to support additional steel girders, reinforcing steel and concrete to achieve design specifications.

When it was time to remove the false piles, divers cut the piles off at the mudline, leaving almost seventy feet of pipe in the ground. A crane removed the cut pieces. In order to remove the large slab's bottom forms, the team used a specially fitted backhoe. Positioned on the deck, the backhoe was able to reach underneath the slab and extract the false work from under the bridge.

Because pumped sand from the nearby river was beneath the Interstate's original foundation, the project team had to find a way to build the foundation for the adjacent roadway without risking erosion. The contractors drove steel sheeting beneath the expanded Interstate's footprint as a temporary hold while the foundation was made, which successfully prevented ground erosion and shifting. DOTD has used this method as standard practice in other situations where marshlands and swamps pose similar challenges to roadway construction.

During the demolition and construction, crews exerted special effort to minimize detrimental impacts to the surrounding environment. They removed all demolition debris from the canal and dredged it to increase water flow through the project site. To save money, they used excavated material as fill at an adjacent project site.

For work on the over 750 linear feet of concrete median barrier wall, the team introduced a new piece of equipment: a double-faced hydraulic mule attached to the slip form-paving machine. This innovation saved the team from having to hand form and erect all 750 feet of median, further reducing project time.

The team's most notable achievement, however, might have been the over 2,000 cubic yards pour, completed in a single night. Carlo Ditta, the project's concrete supplier, mobilized his entire fleet of 38 trucks, and used all three of his plants to provide enough concrete for the pour. Traffic was diverted overnight, and because all workers, suppliers and relevant partners were on hand throughout the pour, the finished product met the high quality standards required by the contract. By 5:30 a.m. the pour was finished, and the roadway reopened to morning commuters.

Public Information and Collaboration

One of the most prominent features of this project was the way the traffic flow was managed in what is the most heavily traveled area in the City, if not in the State. *The Times-Picayune* of New Orleans reported that the public initially viewed the project with dread. However, traffic control was planned in such a way that the public continued to use the road with few obstructions and local businesses faced minimal impacts.

The team's consistent engagement with travelers, local authorities, and the media helped maintain healthy relationships. DOTD enforced special provisions so traffic was never completely stopped by lane closures during peak traffic times. The Louisiana State Police, Jefferson Parish Police, and Causeway Police assisted in curbing traffic chaos. The Motorist Assistance Patrol was also on hand to help resolve motorist vehicle troubles to keep traffic flowing. The contractor worked with the news media to communicate project traffic information. A key feature of the public relations campaign was Boh Bros. decision to send project managers and superintendents to a media relations classes to train in the distribution of useful and timely information.

Other work zone innovations also kept traffic moving, such as six message boards describing delays or closures. DOTD also used radio traffic announcements to provide up-to-the-minute information to travelers.

A unique and dynamic communication innovation was the Intelligent Transportation System (ITS), which comprised six strategically-placed cameras on the roadway, viewable at all times on the DOTD website. The ITS webcams relayed traffic status at various places along the Interchange, allowing the project team to deal immediately with traffic flow problems and other issues. The system boosted DOTD's ability to avoid massive congestion and has been extensively employed to reduce work zone traffic in Louisiana since its debut on this project.

Monthly partnering update meetings were held at the project site to review job progress, scheduling and production. The meetings shared written feedback questionnaires from all parties and identified issues and concerns. These monthly meetings kept all parties informed of project details; they also focused the team on mutually-established goals. In addition, executive partnering meetings between Boh Bros. representatives and officials from DOTD enabled regular reviews and assessed the impact of the work zones on the traveling public.

Kent Israel, DOTD Road Design Engineer Administrator, described the project's challenges, "The tremendous scope of the project in terms of its scale, its technological requirements and the traffic involved posed a major hurdle. The contractors successfully handled this with careful planning and competent managing of the traffic and the media."

Brian Buckel, DOTD District Construction Engineer, agreed that the traffic during construction was the most challenging aspect of the project. Its mitigation techniques--from active engagement with the public through the media to a blanketing of public service announcements of lane closures to maximized night and weekend work--have broad application. "Lessons learned in dealing with the public and media during the I-10/I-610 Interchange project have been applied to the rest of the series of Interstate improvements in the area in the past five years," said Buckel.

Interstate I-10/I-610 Interchange before construction was named one of the ten worst bottlenecks in the country, with nearly 160,000 commuters using a road originally designed for maximum capacity of 70,000.



With successful planning, cooperation and innovation, the busy I-10/I-610 Interchange in New Orleans was successfully widened to accommodate 176,000 vehicles, allowing traffic to flow more smoothly during normal rush-hours as well as during hurricane evacuations.



Ultimate Test of Design, Construction and Quality

Because the I-10/I-610 Interchange is part of a major hurricane evacuation route, all plans had to meet the highest standards. The 17th Street Canal is open to Lake Pontchartrain and subject to rising tidewater during a hurricane. Throughout the construction, the contractor had to ensure the canal bridge was protected during the threat of a hurricane to an elevation of +15 feet.

The bridge design incorporated features that would ensure its stability and the

safety of travelers during an evacuation. Concrete barrier walls and a three-foot thick deck were installed, both of which had to be watertight. The top of the barrier wall was designed to a minimum elevation of +15 feet and the bridge deck elevation ranged from +11 to +13 feet. This all meant that flood waters could rise to +15 feet and the bridge would still be passable. Also, the three-foot thick slab ensured rising water underneath and around the bridge would not cause the bridge to float or become buoyant.

During Hurricane Katrina, the Interchange took the ultimate “real world” test. The result: it succeeded in its pivotal function as a hurricane evacuation route. In the days following the hurricane, the I-10/I-610 Interchange proved critical to rescue efforts; FEMA and rescue organizations used the widened highway as a helicopter landing and staging site, too. The bridge sustained no permanent or substantive damage. Today the Interchange continues to remain a serviceable and highly used roadway and plays a key role in the restoration of the New Orleans area.

“The Results Speak for Themselves”

The I-10/I-610 expansion project flourished because of innovative design and engineering and progressive communications like ITS Interstate web cams. Teamwork also fueled success. Al Flettrich, Bridge Division Manager for Boh Bros., elaborated, “Cooperation with the DOTD to get timely responses to issues, and cooperation with our subcontractors and suppliers resulted in a project without delays and an expedited schedule. The results speak for themselves.”

The project received multiple accolades, including the American Concrete Institute Award and the Greater New Orleans Business Roundtable CICE Award. *L.A. Contractor* magazine named the expansion the “Best Transportation Project of 2000.” Boh Bros. completed the project eight months early, earning the completion bonus and, more importantly, opening extra lanes for the dual purposes of potential hurricane evacuation and commuter traffic in and out of New Orleans. The efficiency and commitment to safety demonstrated by the I-10/I-610 project team from design to delivery typify the FHWA Highways for LIFE performance standards.